INGRESS PREVENTION FOR KEYBOARDS

FIELD

[0001] The described embodiments relate generally to keyboards. More particularly, the present embodiments relate to structures that prevent ingress of contaminants such as dust or liquid into keyboards.

BACKGROUND

[0002] Electronic devices use a variety of different input devices. Examples of such input devices include keyboards, computer mice, touch screens, buttons, trackpads, and so on. Some input devices may be incorporated into an electronic device. The electronic device may be vulnerable to contaminants, such as dust or liquid, entering though openings or connections in or around one or more incorporated input devices or external input devices. The external input devices may themselves be vulnerable to contaminants entering through various openings or connections.

[0003] For example, keyboards typically involve a number of moving keys. Liquid ingress around the keys into the keyboard can damage electronics. Residues from such liquids, such as sugar, may corrode or block electrical contacts, prevent key movement by bonding moving parts, and so on. Solid contaminants (such as dust, dirt, food crumbs, and the like) may lodge under keys, blocking electrical contacts, getting in the way of key movement, and so on.

SUMMARY

[0004] The present disclosure relates to keyboards and/or other input devices that include mechanisms that prevent and/or alleviate contaminant (such as dust, liquid, and so on) ingress. These mechanisms may include membranes or gaskets that block contaminant ingress; structures such as brushes, wipers, or flaps that block gaps around key caps; funnels, skirts, bands, or other guard structures coupled to key caps that block contaminant ingress into and/or direct contaminants away from areas under the key caps; bellows that blast contaminants with forced gas out from around the key caps, into cavities in a substrate of the keyboard, and so on; and/or various active or passive mechanisms that drive contaminants away from the keyboard and/or prevent and/or alleviate contaminant ingress into and/or through the keyboard.

[0005] In various embodiments, a key includes a foundation, an actuator moveably coupled to the foundation between a depressed position and an undepressed position, and a skirt coupled to the actuator that is configured to form a perimeter around the actuator. The skirt is in contact with the foundation when the actuator is in the undepressed position and in compression between the actuator and the foundation when the actuator is in the undepressed position.

[0006] In some examples, the skirt is an elastomer. In some implementations, the skirt may be an elastomer band. The elastomer band may extend from the actuator at an angle between the actuator and the substrate, change the angle at which the elastomer band extends between the actuator and the foundation, extend from all sides of the actuator, define a vent, and be operable to force contaminants into a cavity defined in the foundation using gas forced from the vent.

[0007] In various examples, the skirt expands when the actuator moves toward the depressed position. In numerous examples, the skirt forms a seal between the actuator and the foundation. In some examples, the skirt defines a vent skirt defines a vent with dimensions that allow the passage of gas but restrict the passage of liquid.

[0008] In some examples, the skirt forces gas through an aperture when the actuator moves toward the depressed position. In various examples, the skirt biases the actuator toward the undepressed position. In some examples, the skirt extends from a side of the actuator at an angle and the angle at which the actuator extends changes when the actuator travels toward the depressed position

[0009] In numerous embodiments, a keyboard assembly includes a substrate, a key cap, a movement mechanism moveably coupling the key cap to the substrate, and a guard structure extending from the key cap that funnels contaminants away from the movement mechanism. In some implementations, the substrate defines a cavity and the guard structure funnels the contaminants into the cavity.

[0010] In various examples, the substrate defines a cavity and the guard structure funnels the contaminants into the cavity. In some examples, the guard structure surrounds the key cap. In numerous examples, the guard structure is rigid, is separated from the substrate when the key cap is in an undepressed position, includes a mouth positioned over a hole in the substrate, and moves with the key cap. In various implementations of such examples, the guard structure does not contact the substrate when the key cap is in a depressed position.

[0011] In some embodiments, a keyboard includes a base, a web that defines apertures, keys moveably coupled to the base within the apertures, and a gasket having raised portions coupled to the keys and unraised portions fixed between the web and the base. The gasket is operable to block passage of contaminants into the apertures. Compression of the gasket may force gas through a vent.

[0012] In some examples, the gasket is a layer of fabric and a layer of silicone. In various implementations, the unraised portions are coupled to one of the key caps of the keys, a region between outer and inner key caps of the keys, or a movement mechanism of the keys. In various examples, the gasket is a membrane. In numerous examples, the gasket resists depression of the keys. In some examples, the unraised portions include a first region fixed between the web and the base that is coupled to the web and the base and a second region fixed between the web and the base that is uncoupled from the web and the base.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The disclosure will be readily understood by the following detailed description in conjunction with the accompanying drawings, wherein like reference numerals designate like structural elements.

[0014] FIG. **1** depicts an electronic device including a keyboard.

[0015] FIG. **2** depicts an example exploded view of the keyboard of FIG. **1**.

[0016] FIG. **3**A depicts a first example cross-sectional view of a key assembly of the keyboard of FIG. **1**, taken along line A-A of FIG. **1**.

[0017] FIG. **3**B depicts a first alternative example of the key assembly of FIG. **3**A.

[0018] FIG. **3**C depicts a second alternative example of the key assembly of FIG. **3**A.

[0019] FIG. **3**D depicts a third alternative example of the key assembly of FIG. **3**A.